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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Diego Tirelli

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EXAMINER

BOYLE, ROBERT C

ART UNIT

PAPER NUMBER

4131

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/584,400	Applicant(s) TIRELLI ET AL.	
	Examiner ROBERT C. BOYLE	Art Unit 4131	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/10/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-82 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-82 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/26/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/23/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 42, 45, 47, 48, 54-56, 62-65, 69, 70, 81 and 82 are rejected under 35

U.S.C. 102(e) as being anticipated by Scholz et al., U.S. Patent Application Publication 2003/0139537.

3. Claim 42 discloses a process for producing an epoxidized polymer comprising adding an unsaturated polymer, a hydrogen peroxide precursor, and a carboxylic acid together in the presence of water into a mixing device, reacting the above together, and discharging the product from the device.

4. Scholz teaches reacting a polyalkenylene in an aqueous solution of hydrogen peroxide and a carboxylic acid (abstract). Scholz teaches that these are added into a flask with a stirrer, and after the reaction, the product was removed from the flask (paragraphs 0027-0029). Aqueous hydrogen peroxide is capable of forming hydrogen peroxide and therefore acts as a hydrogen peroxide precursor.

5. Claim 45 discloses adding the polymer as a solid. Scholz teaches adding the polymer to the reaction flask as a solid (paragraph 0028).

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6. Claims 47 and 48 disclose the temperature is between 50°C and 180°C. Scholz teaches the reaction being carried out at 55°C (paragraph 0028).
7. Claim 53 discloses the polymer to be reacted has a Tg of below 20°C. Claim 53 states a property of the polymer disclosed in claim 42. Scholz does not elaborate on the properties recited in claim 53. However, since the same composition that is disclosed in claim 42 is taught in Scholz, the composition of Scholz would have the same properties as the composition disclosed in claim 42.
8. Claim 54 discloses the polymer is polybutadiene. Scholz teaches using polymers of butadiene (paragraph 0021).
9. Claim 55 discloses the polymer is a copolymer with a monoolefin and a diene. Scholz teaches this limitation (paragraph 0022).
10. Claim 56 discloses the polymer is polyisobutene. Scholz teaches using polymers of isobutene (paragraph 0021).
11. Claims 62 and 63 disclose the range of amount of hydrogen peroxide precursor which is added, from 0.1 phr to 50 phr or 0.5 phr to 20 phr. The term "phr" is defined in the specification in paragraph 0048 as "the parts by weight of a given component per 100 parts by weight of the elastomeric polymer containing the ethylenic unsaturations." Scholz teaches using 60 mls of 67% H₂O₂, this falls within the ranges of claims 62 and 63 (paragraph 0027).
12. Claim 64 discloses the carboxylic acid is a monocarboxylic acid, and claim 65 specifies acetic acid. Scholz teaches using acetic acid (paragraph 0023).

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13. Claims 69 and 70 disclose the amount of carboxylic acid to be used, from 0.1 phr to 50 phr or 0.5 phr to 20 phr. Scholz teaches using 32 mls of 85% HCOOH, this falls within the ranges of claims 69 and 70 (paragraph 0036).

14. Claims 81 and 82 disclose the amount of water added to be used, from 0.1 phr to 50 phr or 0.5 phr to 20 phr. Scholz teaches using 60 mls of *aqueous* H₂O₂ (67%), this falls within the ranges of claims 81 and 82 (paragraph 27).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scholz.

17. Claims 51 and 52 disclose the mol% of epoxy groups relative to the polymer is less than 10 mol% and between 0.1 mol% and 5 mol%. Scholz teaches the epoxidized polymer having an epoxide oxygen content between 1 and 25% by mass. This falls within or overlaps the ranges taught by claims 51 and 52. The reference differs from claims 51 and 52 by failing to disclose an example falling within the claimed range, and by failing to disclose a range with sufficient specificity to anticipate the claimed range. However, the reference teaches a range that overlaps the claimed range, and it has been held that overlapping ranges are sufficient to establish *prima facie* obviousness. See MPEP 2144.05.

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18. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected from the overlapping portion of the range taught by the reference because overlapping ranges have been held to establish *prima facie* obviousness.

19. Claims 43, 44, 57, and 71-80 rejected under 35 U.S.C. 103(a) as being unpatentable over Scholz, as applied to claim 42 above, further in view of Ohtsuka et al., U.S. Patent 5,840,809.

20. Claims 43 and 44 disclose the mixing device, specifically a co-rotating twin-screw extruder. Scholz fails to teach this limitation. Ohtsuka teaches using a co-rotating twin screw extruder (abstract; column 7, lines 32-45). One of ordinary skill in the art at the time the invention was made would have been motivated to modify the process in Scholz with the mixer taught in Ohtsuka because using the extruder allows for easier processing because the solvent removing capacity is large and the amount of scorched resin is small, see column 7, lines 28-31 of Ohtsuka et al. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

21. Claim 57 discloses the polymer has an average Mw of 2000 to 1 million. Ohtsuka teaches using polymers with number average Mw in the range of 5000 to 500,000. This falls within the range of claim 57.

22. Claim 71 discloses including a non-ionic surfactant, claim 72 discloses the surfactant includes glycol esters of fatty acids. Ohtsuka teaches using nonionic surfactants that include fatty acid esters that include glycerol distearate (column 12, lines 45-67).

23. Claim 73 discloses that the surfactant can include monoalkanolamides. Ohtsuka teaches using stearamide (column 13, lines 3-5).

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24. Claim 74 discloses the non-ionic surfactant includes polyoxyethylene glycol ethers.

Ohtsuka teaches this limitation (column 13, lines 3-24).

25. Claims 75 and 76 disclose the amount of surfactant to be added, from 0 phr to 20 phr or 0.1 phr to 10 phr. Ohtsuka teaches adding 0.05 to 1 phr (column 12, lines 27-40).

26. Claims 77 and 78 disclose that a stabilizing agent can be added, specifically a hindered phenol. Ohtsuka teaches adding a phenoloic stabilizer (column 2, lines 35-40).

27. Claims 79 and 80 disclose the amount of stabilizing agent to be added, from 0 phr to 10 phr or 0.1 phr to 5 phr. Ohtsuka teaches adding the amount of 0.005 to 10 phr.

28. The reference differs from claims 76 and 80 by failing to disclose an example falling within the claimed ranges, and by failing to disclose a range with sufficient specificity to anticipate the claimed ranges. However, the reference teaches ranges that overlaps the claimed ranges, and it has been held that overlapping ranges are sufficient to establish *prima facie* obviousness. See MPEP 2144.05.

29. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected from the overlapping portion of the ranges taught by the reference because overlapping ranges have been held to establish *prima facie* obviousness.

30. Claims 46, 49, 50, and 66-68 rejected under 35 U.S.C. 103(a) as being unpatentable over Scholz, as applied to claim 42 above, further in view of Zhang et al., *Preparation of Epoxidized Rubber Using a Reactive Processing Technique. I. Synthesis and Characterization of Epoxidized Polybutadiene Rubber*, Journal of Applied Polymer Science, Vol 81, 2987-2992 (2001).

31. Claim 46 discloses adding the H₂O₂ precursor as a solid. Zhang teaches adding MPPA to the reaction mixture as a solid (page 2988). Claim 49 discloses the reaction time is 10 seconds to

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30 minutes. Claim 50 discloses the reaction time is 30 seconds to 20 minutes. Zhang teaches epoxidation in less than 15 minutes (figure 3).

32. One of ordinary skill in the art at the time the invention was made would have been motivated to modify the process in Scholz with the timing taught in Zhang because Zhang teaches the optimization of reaction times of epoxidation reactions (figure 3). Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made.

33. Claims 64 and 66 disclose that dicarboxylic acids can be used. Zhang teaches using phthalic acid (scheme 1, page 2988).

34. Claims 67 and 68 disclose that carboxylic anhydrides can be used, specifically phthalic anhydride. Zhang teaches using phthalic anhydride (p 2988, first paragraph).

35. Claims 58 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scholz, as applied to claim 42 above, further in view of Corey et al., *Buffered Potassium Peroxymonosulfate-Acetone Epoxidation of α,β -Unsaturated Acids*, J. Org. Chem. 1986, 51, 1925-1926.

36. Claim 58 discloses the hydrogen peroxide precursor is an inorganic persalt, and claim 59 discloses that this includes potassium peroxydisulfate. Corey teaches using potassium peroxydisulfate in epoxidations. One of ordinary skill in the art at the time the invention was made would have been motivated to modify the epoxidation process in Scholz with the peroxide precursor taught in Corey because potassium peroxydisulfate allows the epoxidation reaction to be run at low temperatures with no need to control pH, see Corey, page 1926. Therefore, the

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invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made.

37. Claims 58 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scholz, as applied to claim 42 above, further in view of Wurziger et al., WIPO Publication WO 01/83466. For translation reasons, the national stage entry, U.S. Patent Application Publication 2003/0055293, will be cited to.

38. Claim 58 discloses the hydrogen peroxide precursor is a metal peroxide, and claim 60 discloses that this includes zinc peroxide. Wurzinger teaches using zinc peroxide in epoxidation reactions (paragraph 0033). One of ordinary skill in the art at the time the invention was made would have been motivated to modify the process in Scholz with the peroxide precursor taught in Wurzinger because Wurzinger gives an epoxidation process that increases safety to the operators and the environment, see paragraph 0043. Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made.

39. Claims 58 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adam et al., *Methyltrioxorhenium(VII)-Catalyzed Epoxidation of Alkenes with the Urea/Hydrogen Peroxide Adduct*, Angew. Chem. Int. Ed. Engl. 1996, 35, p533-535.

40. Claim 58 discloses the hydrogen peroxide is a hydrogen peroxide adduct, and claim 61 discloses that this includes urea/hydrogen peroxide. Adam teaches using urea/hydrogen peroxide in epoxidation reactions (page 533, second paragraph). One of ordinary skill in the art at the time the invention was made would have been motivated to modify the process in Scholz with the hydrogen peroxide precursor taught in Adam because using an urea/hydrogen peroxide adduct allows the H₂O₂ concentration in the reaction mixture to be exactly dosed, see (page 533, second

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paragraph). Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT C. BOYLE whose telephone number is (571)270-7347. The examiner can normally be reached on Monday-Friday 9:00am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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